



New records of *Xanthacrona* Wulp, 1899 (Diptera, Ulidiidae) from Brazil

Matheus M. M. Soares¹, Aline S. Santiago², Rosaly Ale-Rocha³

1 Graduate Program in Entomology, Instituto Nacional de Pesquisas da Amazônia, Av. André Araújo, Petrópolis, 2936, CEP 69067-375, Manaus, Amazonas, Brazil. **2** Universidade do Estado do Amazonas, Av. Djalma Batista, Chapada, 2470, CEP 69050-010, Manaus, Amazonas, Brazil. **3** Coordenação de Biodiversidade, Instituto Nacional de Pesquisas da Amazônia, Av. André Araújo, Petrópolis, 2936, CEP 69067-375, Manaus, Amazonas, Brazil.

Corresponding author: Matheus M. M. Soares, matheusmmsoares@gmail.com

Abstract

Xanthacrona Wulp, 1899 has been recorded in several countries of South America, but records in Brazil are few. Here, we record *Xanthacrona tuberosa* Cresson, 1908, *Xanthacrona phyllochaeta* Hendel, 1909, and *Xanthacrona tripustulata* Enderlein, 1921 for the first time from Brazil, and provide new records of *Xanthacrona bipustulata* Wulp, 1899 from the states Acre, Amazonas, Espírito Santo, Maranhão, Mato Grosso do Sul, Pará, Roraima, and São Paulo.

Key words

Neotropical Region; picture-winged flies; Pterocallini.

Academic editor: Eliana Buenaventura | Received 23 May 2018 | Accepted 6 September 2018 | Published 21 September 2018

Citation: Soares MMM, Santiago AS, Ale-Rocha R (2018) New records of *Xanthacrona* Wulp, 1899 (Diptera, Ulidiidae) from Brazil. Check List 14 (5): 771–778. <https://doi.org/10.15560/15.5.771>



Introduction

Ulidiidae is a moderately small family of Diptera with 875 species distributed predominantly in the New World (Kameneva and Korneyev 2010). Taxa assigned to this family are mainly saprophagous, although the phytophagous habit is known for a few species, including some of economic importance (Link et al. 1984).

Xanthacrona Wulp, 1899 is a small genus with only 5 described species: *Xanthacrona bipustulata* Wulp, 1899, *Xanthacrona tuberosa* Cresson, 1908, *Xanthacrona phyllochaeta* Hendel, 1909, *Xanthacrona tripustulata* Enderlein, 1921, and *Xanthacrona ypsilon* Enderlein, 1921. Species are easily recognized by the bright yellow scutellum with black spots and the pattern of oblique bands on the wings. The genus is widely distributed in the Neotropical Region, occurring from the South of

the United States to Northern Argentina (Kameneva and Korneyev 2010). A key to species identification is available in Steyskal (1966).

In Brazil, only 2 species, *X. bipustulata* and *X. ypsilon*, have been recorded, both for the state of Rio de Janeiro (Steyskal 1968). Other species have also been recorded in the Neotropical Region. *Xanthacrona tuberosa* was described by Cresson (1908), based on a single specimen collected in Suriname and later identified by Steyskal (1968) from Trinidad and Tobago, French Guiana, and Bolivia. Hernández-Ortiz (1986) recorded *X. tuberosa* from Mexico, whereas Kameneva (2004) and Kameneva et al. (2017) documented it from Costa Rica and Colombia, respectively. *Xanthacrona phyllochaeta* was described by Hendel (1909) from Paraguay and later recorded from Peru and Bolivia by Steyskal (1968) and

from Colombia by Kameneva et al. (2017). *Xanthacrona tripustulata* was described by Enderlein (1921), based on a single female specimen from Paraguay.

Herein, we report *X. phyllochaeta*, *X. tripustulata*, and *X. tuberosa* for the first time in Brazil. In addition, new records are presented for *X. bipustulata* from the states Acre, Amazonas, Espírito Santo, Maranhão, Mato Grosso do Sul, Pará, Roraima, and São Paulo.

Methods

Specimens from 3 institutions, Coleção de Invertebrados do Instituto Nacional de Pesquisas da Amazônia, Amazonas, Brazil (INPA), Museu Paraense Emílio Goeldi, Pará, Brazil (MPEG), and Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil (MZUSP) were examined.

We used the taxonomic key by Steyskal (1966) for species identifications. Terminology follows Cumming and Wood (2009). Wings of some specimens were detached, cleaned by placing in xylol for a short period of time, and mounted on glass slides containing Euparal. After drying, slides were glued by the margin to a small piece of cardboard and pinned with specimen. Specimens were photographed with a Leica MC170 HD digital camera on

a Leica M165C stereomicroscope. The photographs were stacked and combined using Leica Application Suite.

Maps of occurrence were created with Simplemappr (Shorthouse 2010), using geographical coordinates from the specimen labels and bibliography. We used Google Earth® to locate the approximate collecting site for specimens without geographical coordinates. Square brackets were used to complement label information of the material examined. Asterisks represent new records in the section of geographical distribution.

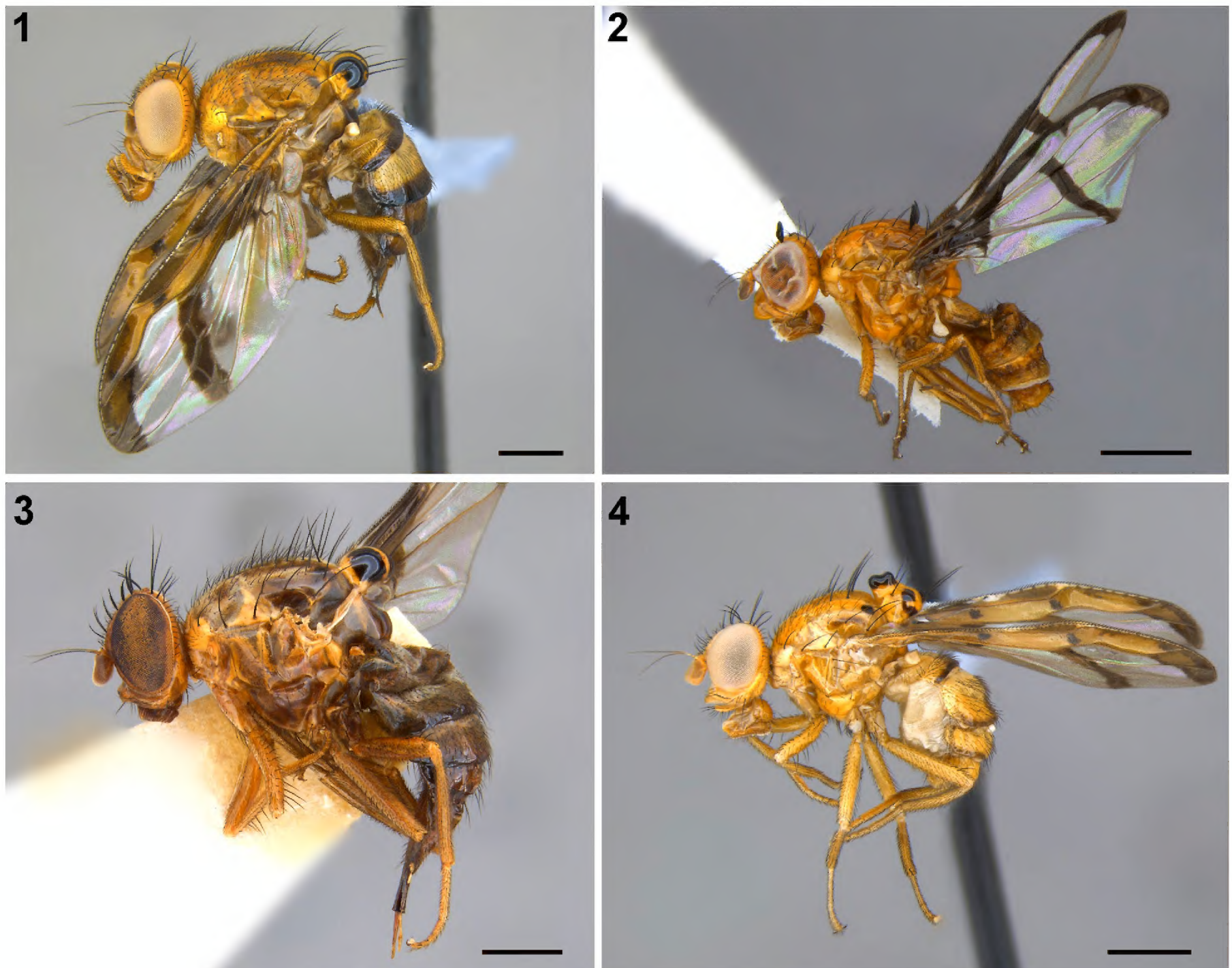
Results

Xanthacrona bipustulata Wulp, 1899

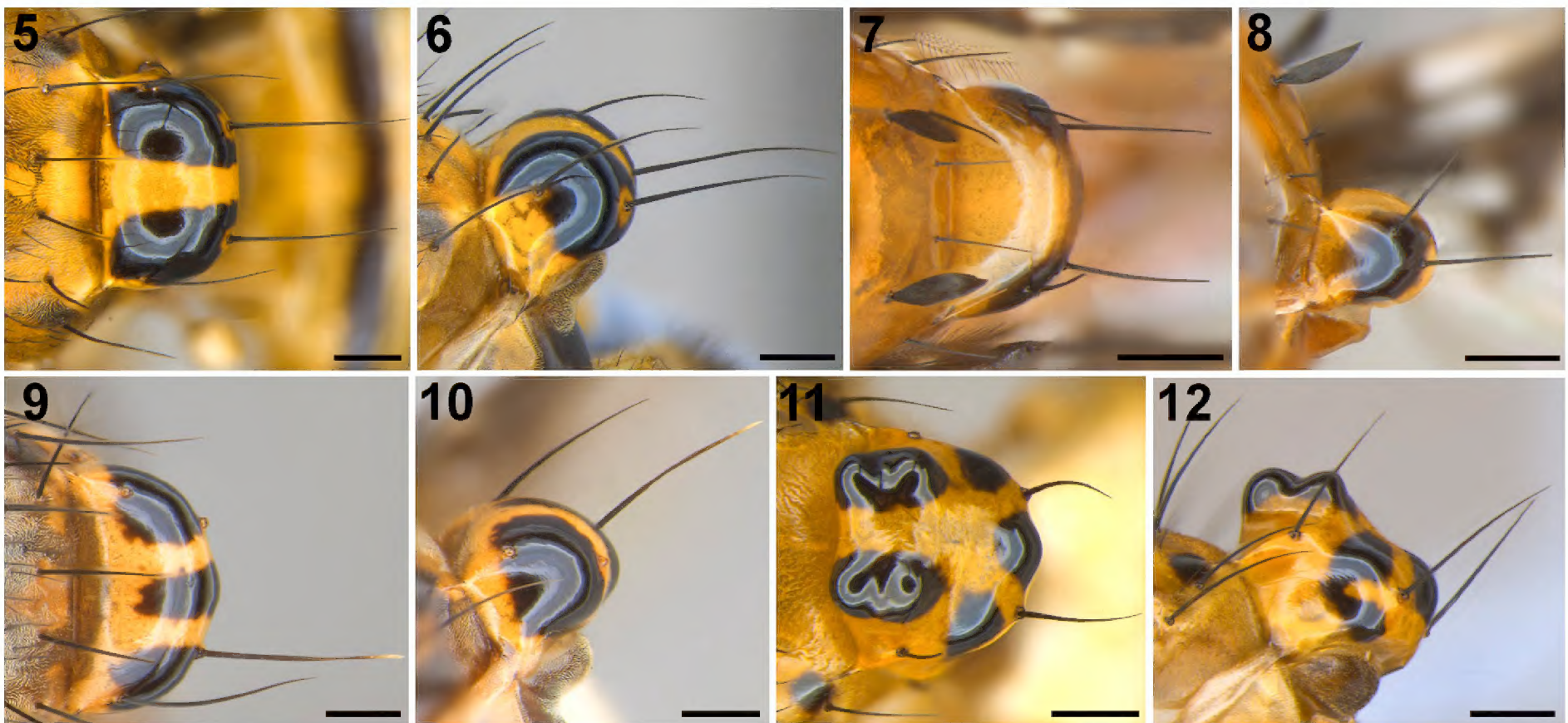
Figures 1, 5, 6, 13, 17

Xanthacrona bipustulata Wulp 1899: 393, pl. 10, figs 29–29a. Type locality: Mazatlan, Mexico. Steyskal 1966: 269 (key); 1968: 54.12 (catalogue); Kameneva and Korneyev 2010: 895, figs 64, 67; Kameneva et al. 2017: 128 (record for Colombia).

Diagnosis. Thorax and legs yellow to orange yellow; abdomen yellow with narrow dark brown band on posterior margin of tergites (Fig. 1) or entirely dark brown; scutellum swollen, yellow, with a large black spot on each



Figures 1–4. Habitus of *Xanthacrona* species. **1.** *X. bipustulata* Wulp. **2.** *X. phyllochaeta* Hendel. **3.** *X. tripustulata* Enderlein. **4.** *X. tuberosa* Cresson. Scale bars = 1 mm.



Figures 5–12. Scutellum of *Xanthacrona* species, dorsal and lateral views. **5, 6.** *X. bipustulata* Wulp. **7, 8.** *X. phyllochaeta* Hendel. **9, 10.** *X. tripustulata* Enderlein. **11, 12.** *X. tuberosa* Cresson. Scale bars = 0.3 mm.

side forming a narrow, complete, median yellow stripe, yellow spots on the base of the bristles (Figs 5, 6); wing with Costal vein predominantly whitish, with alternating dark brown spots, costal cell brown, except for basal half yellow and hyaline apex, cell r_{2+3} predominantly yellow, except for base, apex and a quadrangular dark brown spot at the level of r-m crossvein, median transverse band dark brown, arched and started from costal band, crossing r-m and dm-cu crossveins and reaches to posterior margin of the wing, vein R_{2+3} arched anteriorly at the level of the apex of vein R_1 , distance between crossveins r-m and dm-cu greater than the length of r-m (Fig. 13).

Examined material. Brazil, **Acre**, Rio Branco, 25.x–8.xi.91, F. Ramos, A. Henriques, I. Gorayeb, N. Bittencourt, Armadilha Suspensa 16 m, mata várzea (1 female, MPEG); *idem*, malaise [trap], T. [Terra] Firme (1 female,

MPEG). **Amazonas**, Manaus, CIRMAMAN, 2–9.iii.2018, malaise [trap], 03°06'10.1"S, 060°01'58.5"W, M. Soares & A. Santiago (1 female, INPA); *idem*, 3–10.ii.2018 (1 female, INPA); *idem*, 15–23.ix.2017 (1 female, INPA); Campus FUA [Universidade Federal do Amazonas], 19–26.viii.1988, L.P. Albuquerque, Arm. [Armadilha] Shannon: Fezes [feces] (1 male, INPA); *idem*, 07–28.vii.1989 (1 female, INPA); Tonantins, 02°50'15"S, 067°46'30"W, 16–20.ix.2005, arm. Luz [illuminated sheet], J.A. Rafael & F.F. Xavier F° (1 male, 1 female, INPA); Ipixuna, Rio Liberdade, Estirão da Preta, 07°21'46.7"S, 071°52'07.1"W, 13.v.2011, 01:00–04:00h, Arm. Luminosa, dossel [illuminated sheet, in the canopy], J.A. Rafael, J.T. Câmara, R.F. Silva, A. Somavilla, C. Golçalves, A. Agudelo, leg. (1 female, INPA). **Espírito Santo**, Colatina, xii.1970, P.C. Elias col. (1 female, MZUSP). **Maranhão**, S. [São] Pedro da Água Branca,



Figures 13–16. Wings of *Xanthacrona* species. **13.** *X. bipustulata* Wulp. **14.** *X. phyllochaeta* Hendel. **15.** *X. tripustulata* Enderlein. **16.** *X. tuberosa* Cresson. Scale bars = 1 mm.

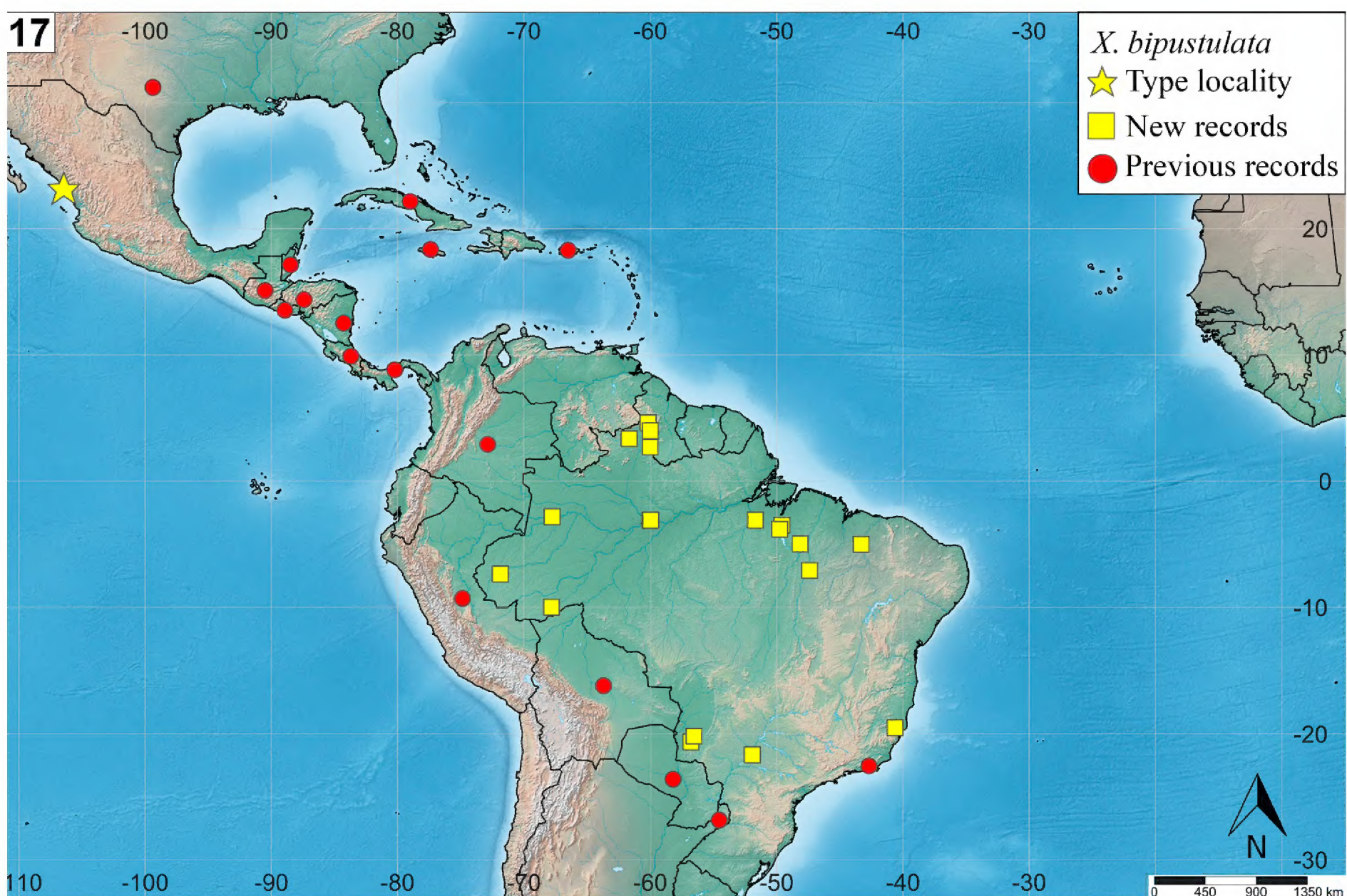


Figure 17. Geographical distribution of *Xanthacrona bipustulata* Wulp.

F. [Fazenda] Esplanada, 04°59'05"S, 048°08'03"W, 05.xii.2001, J.A. Rafael, F.L. Oliveira & J. Vidal, malaise [trap] (1 female, INPA); Caxias, Res. [Reserva] Ecológica Inhamum, Armadilha malaise, 02–08.vi.2005, G.A. Cunha col. (1 female, INPA); Carolina, Serra Grande, 07°04'28"S, 047°24'12"W, 13.xii.2001, F.L. Oliveira & J. Vidal, malaise [trap] (1 male, INPA). **Mato Grosso [do Sul]**, Bodoquena, xi.1941, Com. I.O.C. [Instituto Oswaldo Cruz] (1 female, MZUSP); Salobra, Jan. [January] 941 [1941], Com. I.O.C. [Instituto Oswaldo Cruz] (1 female, MZUSP). **Pará**, Rio Tocantins, Próx. [Próximo] Cid. [Cidade] N. [Nazaré] dos Patos, 12.04.81 (3 males, 1 female, INPA); *idem*, 11.iv.81, Eq. Nunes Mello (1 female, INPA); R. [Rio] Tocantins, Ilha M^a [Maria] Juriti, 17.iii.81 (1 male, INPA); Jatobal, I. [Ilha] M^a [Maria] Juriti, 17.iii.81 (2 males, 2 females, INPA); Tucuruí, Ig. [Igarapé] Do Pitinga, 10.iv.81 (1 female, INPA); Belo Monte, Rio Xingu, Rodovia Transamazônica, 03°05'52"S, 051°41'31"W, 07.iv.2008, armadilha luz [illuminated sheet], J.A. Rafael & F.F. Xavier F^o (3 males, INPA). **Roraima**, Rio Uraricoera, Ilha de Maracá, 21–30.xi.1987, J.A. Rafael & equipe, armadilha de malaise (1 female, INPA); *idem*, Armadilha de Shannon (1 male, 1 female, INPA); *idem*, 2–13.v.1987, J.A. Rafael (1 female, INPA); *idem*, 1–4.iii.1988 (1 female, INPA); Bonfim, Rio Tacutu, malaise [trap], v.1991, J.A. Rafael, R.A. Rocha, J. Vidal (1 male, 1 female, INPA); Normandia, Serra, malaise [trap], v.1991, J.A. Rafael, R.A. Rocha, J. Vidal (1 male, INPA); Uiramutá, Rio Wailá, 04°37'50"N, 060°09'46"W, 19–22.iii.2007, F.F. Xavier

F^o, Arm. malaise (3 males, INPA). **São Paulo**, marg. [margem] esq. [esquerda] R. [Rio] Paraná, 19.x.1964, exp. Depto. Zool. (1 female, MZUSP).

Geographical distribution (Fig. 17). Argentina, Belize, Bolivia, Brazil (Acre*, Amazonas*, Espírito Santo*, Maranhão*, Mato Grosso do Sul*, Pará*, Rio de Janeiro, Roraima*, São Paulo*), Colombia, Costa Rica, Cuba, El Salvador, Guatemala, Honduras, Jamaica, Mexico, Nicaragua, Panama, Paraguay, Peru, Puerto Rico, and United States (Kameneva et al. 2017).

Xanthacrona phyllochaeta Hendel, 1909

Figures 2, 7, 8, 14, 18

Xanthacrona phyllochaeta Hendel 1909: 74. Type locality: Paraguay. Steyskal 1966: 269 (key); 1968: 54.12 (catalogue); Kameneva and Korneyev 2010: 895, fig. 65; Kameneva et al. 2017: 129 (record for Colombia).

Diagnosis. Thorax and legs yellow to orange yellow; abdomen pale yellow to brown (Fig. 2); posterior orbital seta and penultimate dorsocentral seta drop-shaped (Figs 2, 7, 8); scutellum slightly swollen, largely yellow, with a small dark spot on each side (Figs 7, 8); wing with costal cell dark brown, with large hyaline median area, cell r_{2+3} predominantly hyaline, median transverse band dark brown, straight and separated from costal band by hyaline area in cell r_{2+3} at the level of r-m crossvein, vein R_{2+3} straight, section of vein M between crossveins r-m and dm-cu strongly approximated, distance between them less than half of r-m length (Fig. 14).

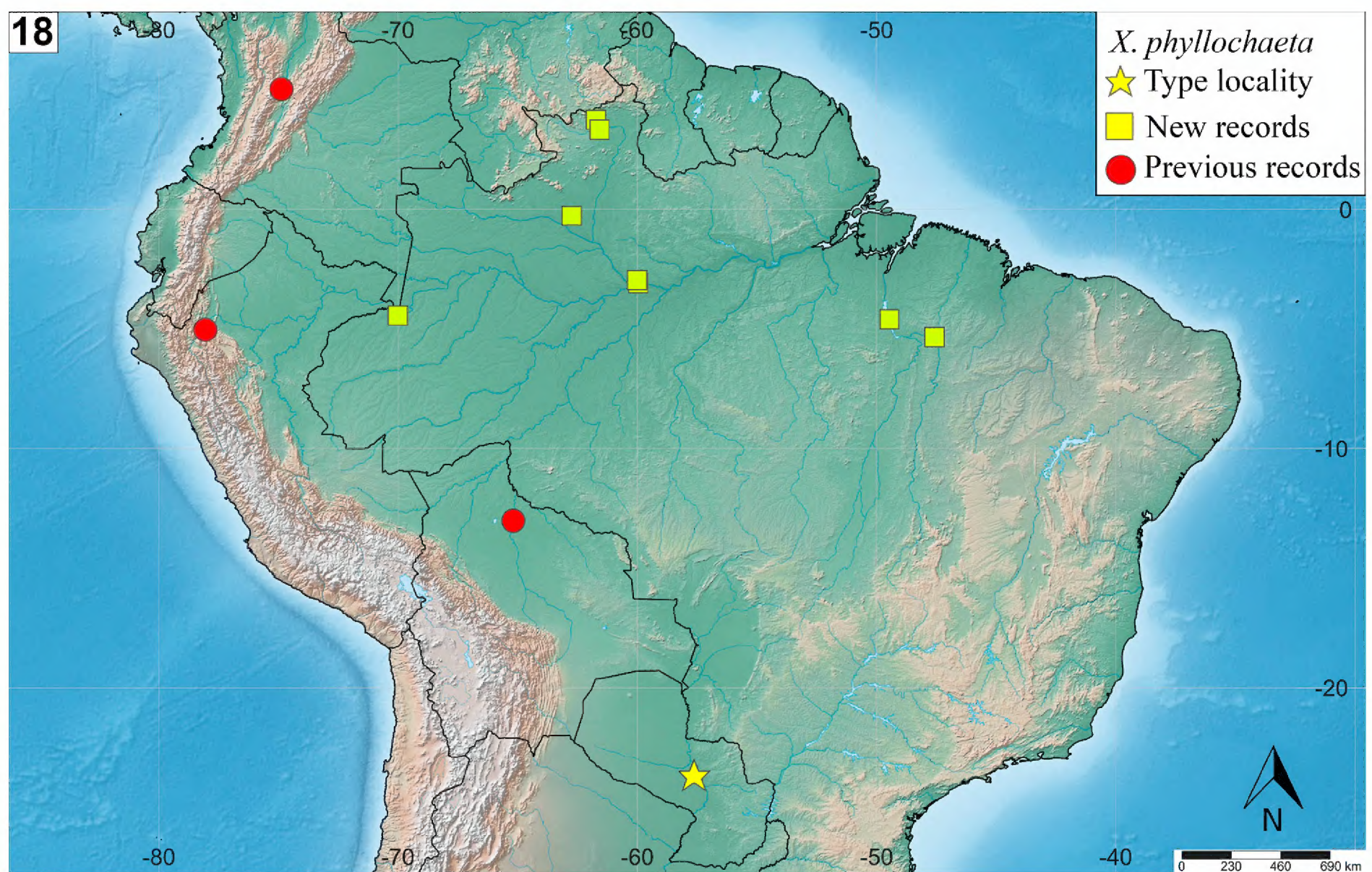


Figure 18. Geographical distribution of *Xanthacrona phyllochaeta* Hendel.

Examined material. [Brazil, **Amazonas**, Manaus], CAMPUS U.A. [Universidade Federal do Amazonas], 10–11.x.82, Luz fluorescente [Fluorescent lamp] col. Paulo F. Burnhein (2 females, INPA); *idem*, Arm. ESALQ Blb-BI [modified pennsylvania trap], 25–26.ix.82 (3 females, INPA); *idem*, 05–06.x.1982, col. Ulisses Barbosa (1 male, INPA); *idem*, 11–19.viii.1988, Marcia Castilho, J. Elias Binda, Arm. Shannon, isca fezes [feces bait] (1 female, INPA); AM1 [*sic* = AM-010], KM16, 16.vii.1969, Col. E.V. Silva (1 male, INPA); Benjamin Constant, Ig. [Igarapé] Crajarizinho, 04°26'35"S, 069°59'58"W, 09.ix.2005, arm. Luz [illuminated sheet], J.A. Rafael & F.F. Xavier F° (1 male, 1 female, INPA); Barcelos, 20–21.viii.2008, Rio Demeni, próx. [próximo] ao Jalauca, Na Luz [illuminated sheet], em barco em movimento [on boat, in movement], A. Filho & R. Machado (1 female, INPA); *idem*, Jalauca, viii.2008, 00°16'15"S, 062°44'49"W, Arm. Malaise terra-firme, Floresta (1 female, INPA). **Maranhão**, Imperatriz, Ribeirãozinho, 5–10.viii.1984, armadilha malaise, F.F. Ramos (3 females, MPEG). **Pará**, R. [Rio] Tocantins, Ilha M^a [Maria] Juriti, 17.iii.81 (1 female, INPA). **Roraima**, Amajari, Tepequém, SESC, 03°44'45"N, 061°43'40"W, 14.xii.2015, J.A. Rafael & F.F. Xavier F°, arm. Luminosa lençol [illuminated sheet] (2 males, 3 females, INPA); Rio Uraricoera, Ilha de Maracá, 21–30.xi.1987, J.A. Rafael & equipe, Armadilha de Shannon (1 male, 9 females, INPA); *idem*, malaise [trap] (1 female, INPA); *idem*, 02–13.v.1987, J.A. Rafael, J.E.B. Brasil, L.S. Aquino (1 female, INPA).

Geographical distribution (Fig. 18). Bolivia, Brazil*

(Amazonas, Maranhão, Pará, Roraima), Colombia, Paraguay, and Peru (Kameneva et al. 2017).

Xanthacrona tripustulata Enderlein, 1921

Figures 3, 9, 10, 15, 19

Xanthacrona tripustulata Enderlein 1921: 212. Type locality: Paraguay. Steyskal 1966: 269 (key); 1968: 54.12 (catalogue); Kameneva and Korneyev 2010: 895, fig. 66.

Diagnosis. Thorax predominantly brown, except post-pronotal lobe, notopleuron and small areas on mesopleuron yellow; abdomen yellow with a narrow brown band on distal margin of tergites or completely brown (Fig. 3); scutellum swollen, largely yellow, except for 3 black spots on distal margin (Figs 9, 10); wing with Costal vein predominantly yellow, with alternating brown spots, costal cell brown with hyaline margins, cell r_{2+3} brown with two large sub-rectangular yellow spots, median transverse band brown, arched and started from costal band, crossing r-m and dm-cu crossveins and reaches to posterior margin of the wing, vein R_{2+3} arched anteriorly at the level of the apex of vein R_1 , distance between crossveins r-m and dm-cu equal to the length of r-m (Fig. 15).

Examined material. Brazil, **Acre**, Rio Branco, 25.x–8.xi.91, F. Ramos, A. Henriques, I. Gorayeb, N. Bittencourt, Armadilha malaise, Mata T. [Terra] Firme (1 female, MPEG). **Bahia**, Santa Terezinha, Serra Jibóia, 12°51'13"S, 039°28'32"W, 800 m, 08.vi.2007, J.A. Rafael & F.F. Xavier F°, Luz [illuminated sheet] (1 female, INPA). **Mato Grosso [do Sul]**, Salobra, Jan. [January]

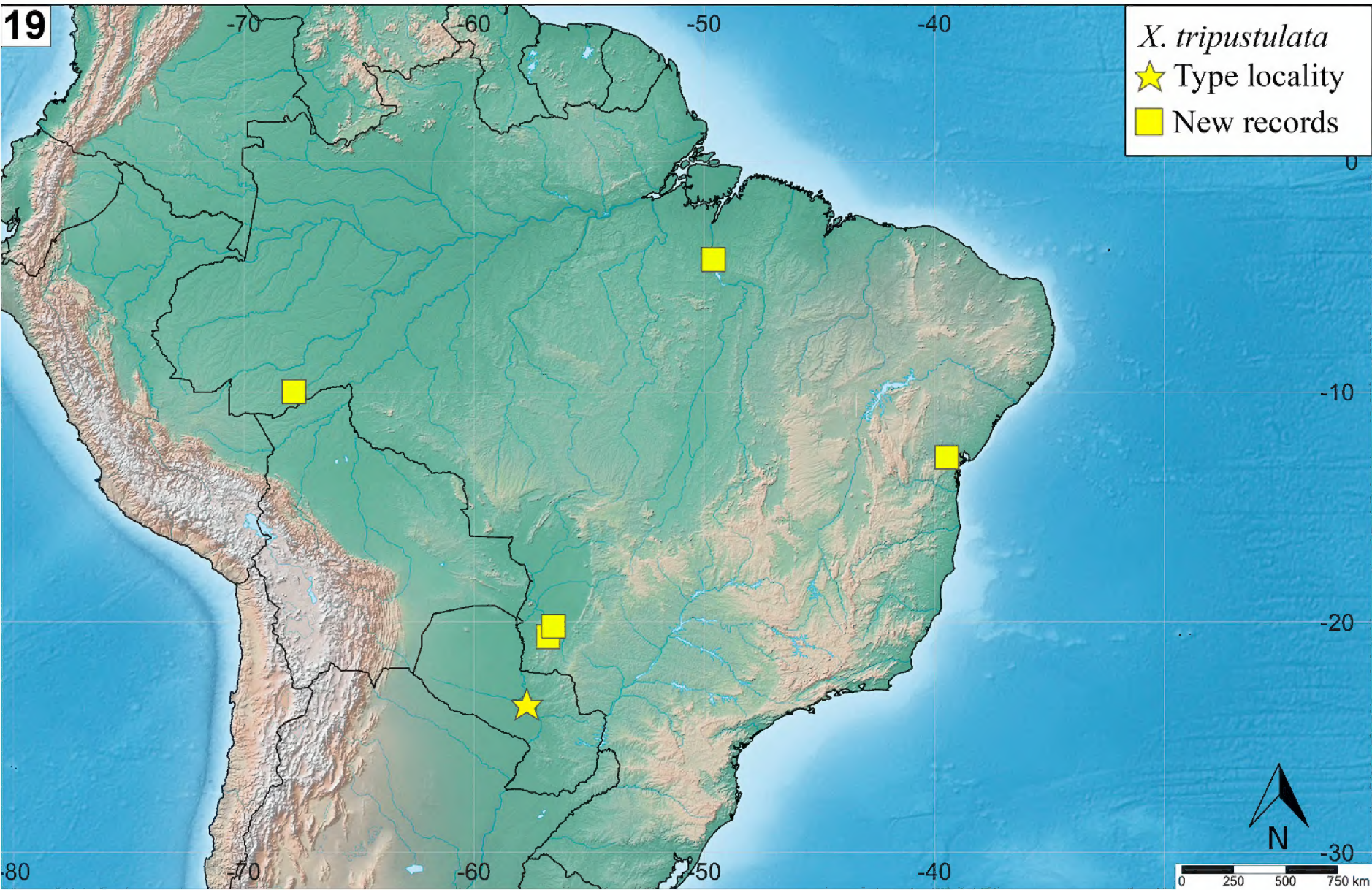


Figure 19. Geographical distribution of *Xanthacrona tripustulata* Enderlein.

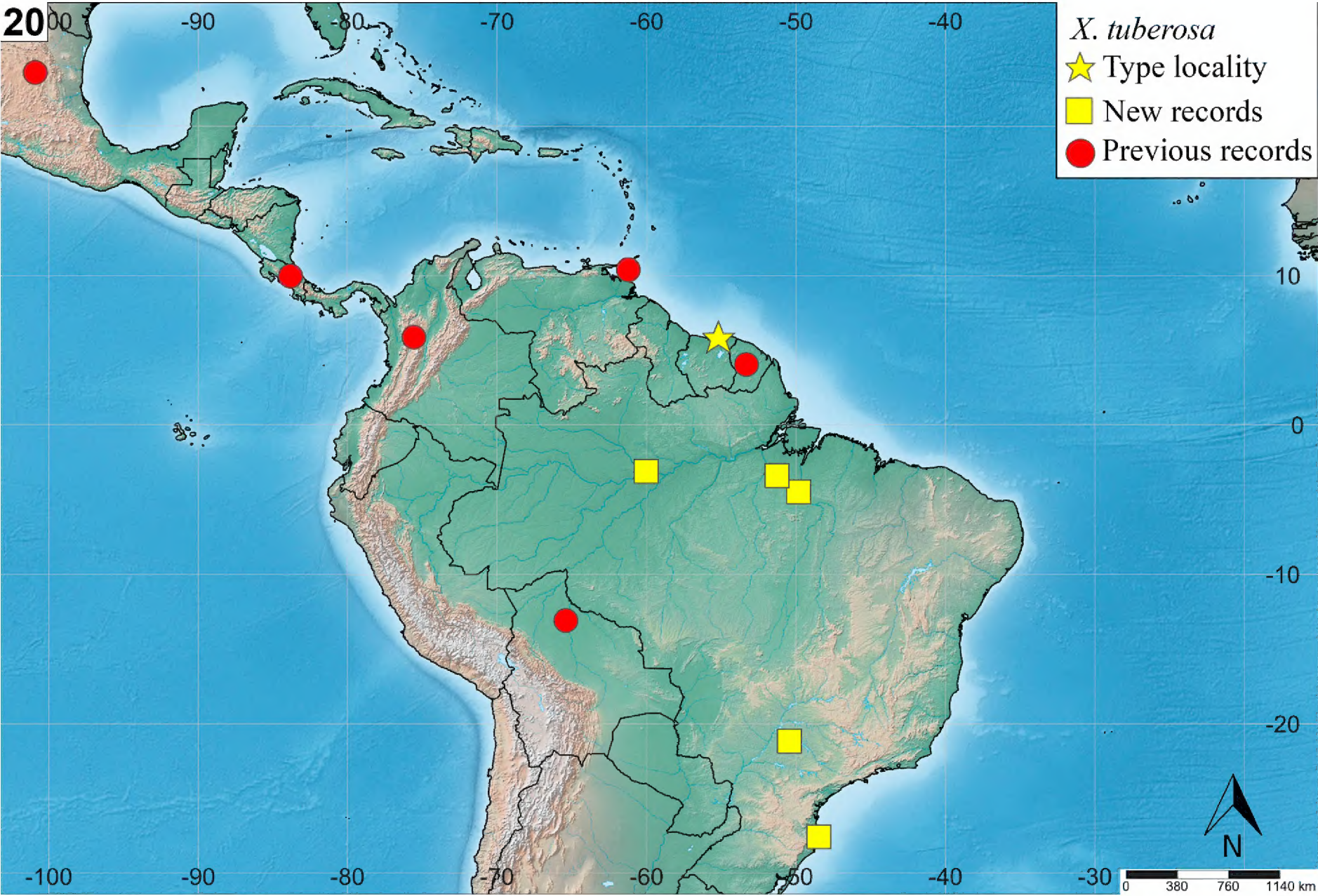


Figure 20. Geographical distribution of *Xanthacrona tuberosa* Cresson.

941 [1941], Com. I.O.C. [Instituto Oswaldo Cruz] (1 male, 3 females, MZUSP); Bodoquena, xi.1941, Com. I.O.C. [Instituto Oswaldo Cruz] (1 female, MZUSP). **Pará**, R. [Rio] Tocantins, Ilha M^a [Maria] Juriti, 17.iii.81 (1 female, INPA); Jatobal, I. [Ilha] M^a [Maria] de Juriti, 17.iii.81 (1 female, INPA).

Geographical distribution (Fig. 19). Brazil* (Acre, Bahia, Mato Grosso do Sul, Pará), Paraguay (Steyskal 1968).

Xanthacrona tuberosa Cresson, 1908

Figures 4, 11, 12, 16, 20

Xanthacrona tuberosa Cresson 1908: 97, pl. 6, figs 2, 3. Type locality: Paramaribo, Suriname. Steyskal 1966: 269 (key); 1968: 54.12 (catalogue); Hernández-Hortiz 1986: 220 (record for Mexico); Kameneva 2004: 649 (record for Costa Rica); Kameneva and Korneyev 2010: 895, fig. 68; Kameneva et al. 2017: 129 (record for Colombia).

Diagnosis. Body yellow to orange yellow, except for abdomen with very narrow brown bands on posterior margins of tergites (Fig. 4); scutellum with a pair of black high two-domed dorsal elevations, margin of scutellum with three black spots, lateral pair extended ventrally toward lower base of scutellum (Figs 11–12); wing with Costal vein predominantly whitish, with alternating dark brown spots, costal cell yellow with two medial and apical indentation, medial one surrounded by narrow dark brown area, cell r_1 brown except for small hyaline area at apex of R_1 , cell r_{2+3} predominantly yellow, except for apex brown and two dark brown to black spots, one near to the apex of subcostal vein and the other one at the level of r-m crossvein, median transverse band dark brown, arched and started from costal band, crossing r-m and dm-cu crossveins and reaches to posterior margin of the wing, vein R_{2+3} arched anteriorly at the level of the apex of vein R_1 , crossveins r-m and dm-cu distant from each other, distance between them greater than the length of r-m (Fig. 16).

Examined material. Brazil, **Amazonas**, Manaus, CIRMMAN, 2–9.iii.2018, malaise [trap], 03°06′10.1″S, 060°01′58.5″W, M. Soares & A. Santiago (2 males, 1 female, INPA); *idem*, Suspensa Amarela (1 male, INPA); *idem*, 3–10.ii.2018, malaise [trap] (1 male, 1 female, INPA). **Pará**, Novo Repartimento, RI Pakaranã, 100 m, 04°29′05″S, 049°50′21″W, 05.iv.2008, arm. Luz [illuminated sheet], J.A. Rafael & F.F. Xavier F^o (1 male, INPA); Anapu, Rod. [Rodovia] Transamazônica, Rio São José, 50 m, 03°24′18″S, 051°16′37″W, 06.iv.2008, arm. Luz [illuminated sheet], J.A. Rafael & F.F. Xavier F^o (1 male, INPA). **Santa Catarina**, Florianópolis, Ferreira N. col. (1 male, MZUSP). **São Paulo**, Araçatuba, Faz. [Fazenda] Jacaretinga, 10–15.vi.1968, Rabello col. (1 male, MZUSP).

Geographical distribution (Fig. 20). Bolivia, Brazil* (Amazonas, Pará, Santa Catarina, São Paulo), Colombia, Costa Rica, French Guiana, Mexico, Surinam, and Trinidad and Tobago (Kameneva et al. 2017).

Discussion

Xanthacrona is widely distributed in the Neotropical Region and has already been recorded in countries bordering Brazil (Guiana, Suriname, Colombia, Peru, Bolivia, Paraguay, and Argentina). Two species, *X. bipustulata* and *X. ypsilon*, were recorded from the country, both from the Atlantic Forest biome in Rio de Janeiro.

In this work, we expanded the distributions of 4 species of the genus in Brazil, 3 of which are new to the country. This demonstrates that the genus is widespread and occurs in several Brazilian biomes. The distribution of *X. bipustulata* is extended to the Amazonian biome (Northern Region states of Acre, Amazonas, Pará, and Roraima), to the Cerrado biome (Northeast Region state of Maranhão), and to the Pantanal biome (Central-West region state of Mato Grosso do Sul). In addition, some specimens of *X. bipustulata* and *X. tuberosa* were collected in a small and disturbed forest fragment in the city of Manaus, state of Amazonas, indicating that these species may be adapted to adverse environmental conditions.

Most of the studied specimens (both sexes) were collected with light traps, such as a Shannon trap and an illuminated sheet, and it can be inferred that these methods are very effective.

Knowledge of the genus in the Brazil is still scarce. However, the new information, including the diagnoses, photographs, and distribution maps, should contribute to future studies.

Acknowledgements

We thank the curators Marcio Luiz de Oliveira (INPA) and Orlando Tobias Silveira (MPEG) for making available the studied specimens, Lisiane Dilli Wendt for the photographs of (MZUSP) specimens, Rafael A. P. Freitas-Silva for suggestions on and discussions of previous versions of the manuscript, and Saeed Mohamadzade Namin and Valery Korneyev for review. We are grateful to the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for providing the doctoral scholarship to first author, the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for the support to third author through a PQ Fellowship and grant provided to the project “Sistemática morfológica de Periscelididae, taxonomia dos gêneros neotropicais e estudos bioecológicos de espécies amazônicas (Diptera, Opomyzoidea)”, Edital MCTI/CNPQ/Universal 14/2014, no. 457485/2014-0.

Authors' Contributions

MMMS collected, photographed, and identified specimens, wrote the manuscript, and prepared the map. ASS collected specimens and wrote the manuscript. RAR wrote the manuscript.

References

- Cresson ET Jr (1908) Two new species belonging to the dipterous families Ortalidae and Trypetidae from Dutch Guiana, with notes on others of these groups. *Entomological News* 19: 95–99.
- Cumming JF, Wood DM (2009) Adult morphology and terminology. In: Brown BV, Borkent A, Cumming JM, Wood DM, Woodley NE, Zumbado MA (Eds) *Manual of Central America Diptera*. Vol. 1. NRC Research Press, Ottawa, 9–64.
- Enderlein G (1921) Zur Kenntnis der Pterocallinen. *Zoologischen Anzeiger* 52: 211–219.
- Hendel F (1909) Übersicht der bisher bekannten Arten der Pterocalliden (Dipt.). *Deutsche Entomologische Zeitschrift, Beiheft*: 1–84.
- Hernández-Ortiz V (1986) Nuevos registros para México del género *Xanthacrona* Wulp (Diptera: Otitidae). *Anales del Instituto de Biología, Universidad Nacional Autónoma de México, Serie Zoología* 57 (1): 219–220.
- Kameneva EP (2004) New records of picture-winged flies (Diptera: Ulidiidae) of Central America. *Studia Dipterologica* 10: 609–652.
- Kameneva EP, Korneyev VA (2010) 66. Ulidiidae (picture-winged flies). In: Brown BV, Borkent A, Wood DM, Zumbado M (Eds) *Manual of Central American Diptera*, Vol. 2. NRC Press, Ottawa, 883–904.
- Kameneva EP, Korneyev VA, Ramos-Pastrana Y (2017) A new genus, new species and new records of Ulidiidae (Diptera, Tephritoidea) from Colombia. *Vestnik Zoologii* 51 (2): 125–136.
- Link D, Storck L, Cervi JA, Padoin AJ, Giuliani D (1984) Ocorrência da mosca *Euxesta* sp. em milho doce na região de Santa Maria. *Revista Centro de Ciências Rurais* 14 (2): 93–99.
- Shorthouse DP (2010) SimpleMappr, an online tool to produce publication-quality point maps. <http://www.simplemappr.net>. Accessed on: 2018-05-15.
- Steyskal GC (1966) A key to the species of the genus *Xanthacrona* Wulp (Diptera, Otitidae). *Proceedings of the Entomological Society of Washington* 68 (3): 269.
- Steyskal GC (1968) 54. Family Otitidae (Ortalidae; including Pterocallidae, Ulidiidae). In: Vanzolini PE, Papavero N (Eds) *A Catalogue of the Diptera of Americas South of the United States*, 54. Departamento de Zoologia, Secretaria da Agricultura, São Paulo, 54.1–54.31.
- Wulp FM van der (1899) Group Ortalinae. In: Godman FD, Salvin O (Eds) *Biologia Centrali-Americana, Ins., Diptera*, 2, 385–400 + pls 10, 11.